

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum
Internationales Büro



(43) Internationales Veröffentlichungsdatum
27. September 2001 (27.09.2001)

PCT

(10) Internationale Veröffentlichungsnummer
WO 01/71838 A3

(51) Internationale Patentklassifikation⁷: H01M 8/06, F24H 1/00, B60K 6/02, B60L 11/18, H01M 8/00

(71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): PROTON MOTOR FUEL CELL GMBH (DE/DE); Gautinger Strasse 2, 82319 Starnberg (DE).

(21) Internationales Aktenzeichen: PCT/EP01/03062

(72) Erfinder; und

(22) Internationales Anmeldedatum:
16. März 2001 (16.03.2001)

(75) Erfinder/Anmelder (nur für US): HAMELMANN, Roland [DE/DE]; An der Leiten 2, 82327 Tutzing (DE).

(25) Einreichungssprache: Deutsch

(74) Anwalt: KLUNKER, SCHMITT-NILSON, HIRSCH; Winzererstrasse 106, 80797 München (DE).

(26) Veröffentlichungssprache: Deutsch

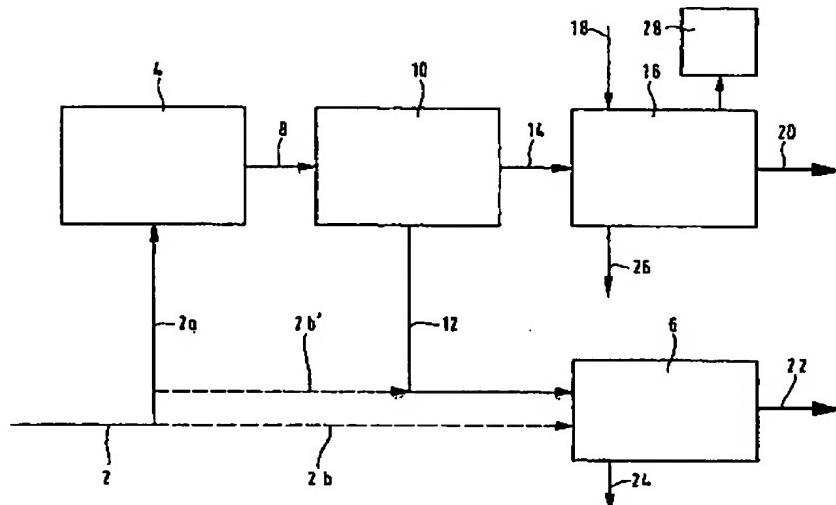
(81) Bestimmungsstaaten (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,

(30) Angaben zur Priorität:
100 13 597.8 18. März 2000 (18.03.2000) DE

[Fortsetzung auf der nächsten Seite]

(54) Title: COMBINATION INSTALLATION COMPRISING A FUEL CELL AND A COMBUSTION ENGINE AND/OR BURNER

(54) Bezeichnung: KOMBINATIONSANLAGE MIT EINER BRENNSTOFFZELLE UND EINEM VERBRENNUNGSMOTOR UND/ODER BRENNER



WO 01/71838 A3
(57) Abstract: The invention relates to an installation for simultaneously generating electricity and another form of energy, namely mechanical energy and/or heat that can be used externally, from a hydrocarbon-based starting fuel (2). The installation comprises the following: (a) a reformer (4) which is configured for partially reforming a flow of starting fuel (2a) delivered to it, producing hydrogen in the process; (b) a separating device (10) which is connected to the reformer (4) in terms of flow and which separates hydrogen from the partially reformed flow of fuel (8); (c) a fuel cell (16) which is connected to the separating device (10) in terms of the flow and which generates electricity (20) from the hydrogen (14) supplied by the separating device (10) and an oxidising agent (18) that is supplied; (d1) a combustion engine (6) to which fuel (12) with a reduced number of hydrogen atoms, originating from the separating device (10) is supplied and which generates mechanical energy (22); and/or (d2) a burner (6) to which fuel (12) with a reduced number of hydrogen atoms, originating from the separating device (10) is supplied and which generates heat (22) that can be used externally.

[Fortsetzung auf der nächsten Seite]



LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX,
MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL,
TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

- (84) Bestimmungsstaaten (*regional*): ARIPO-Patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI-Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Veröffentlicht:

— mit internationalem Recherchenbericht

- (88) Veröffentlichungsdatum des Internationalen Recherchenberichts:

30. Mai 2002

Zur Erklärung der Zwei-Buchstaben-Codes und der anderen Abkürzungen wird auf die Erklärungen ("Guidance Notes on Codes and Abbreviations") am Anfang jeder regulären Ausgabe der PCT-Gazette verwiesen.

- (57) **Zusammenfassung:** Anlage zur gleichzeitigen Erzeugung von Strom und einer weiteren Energieform, nämlich mechanischer Energie und/oder extern nutzbarer Wärme, aus einem Ausgangsbrennstoff (2) auf Kohlenwasserstoffbasis, aufweisend: (a) einen Reformer (4), der für ein partielles Reformieren eines ihm zugeführten Ausgangsbrennstoffstroms (2a) unter Entstehung von Wasserstoff ausgebildet ist; (b) eine mit dem Reformer (4) in Strömungsverbindung stehende Trenneinrichtung (10), mit der sich Wasserstoff von dem partiell reformierten Brennstoffstrom (8) abtrennen lässt; (c) eine mit der Trenneinrichtung (10) in Strömungsverbindung stehende Brennstoffzelle (16), mit der sich Strom (20) aus von der Trenneinrichtung (10) zugeführtem Wasserstoff (14) und einem zugeführten Oxidationsmittel (18) erzeugen lässt; (d1) einen Verbrennungsmotor (6), dem sich an Wasserstoffatomen reduzierter, von der Trenneinrichtung (10) stammender Brennstoff (12) zuführen lässt und mit dem sich mechanische Energie (22) erzeugen lässt; und/oder (d2) einen Brenner (6), dem sich an Wasserstoffatomen reduzierter, von der Trenneinrichtung (10) stammender Brennstoff (12) zuführen lässt und mit dem sich extern nutzbare Wärme (22) erzeugen lässt.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/03062

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01M8/06 F24H1/00 860K6/02 B60L11/18 H01M8/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01M F24H B60K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, CHEM ABS Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>EP 0 751 045 A (DAIMLER BENZ AG) 2 January 1997 (1997-01-02)</p> <p>claims 1-4,16 column 1, line 49 -column 3, line 8; figure 1 column 3, line 24 - line 29 column 3, line 39 - line 48</p> <p>—</p>	<p>1,2,6, 9-11,18, 19,22,23</p>
Y	<p>—</p> <p>—/—</p>	<p>1,5,9, 21,22</p>

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

21 December 2001

Date of mailing of the international search report

24/01/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

D'hondt, J

INTERNATIONAL SEARCH REPORT

Internat	Application No
PCT/EP 01/03062	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 296 449 A (GEORG TELSCHOW CARL ET AL) 3 January 1967 (1967-01-03) claims 1,8; figure 1 column 1, line 54 -column 2, line 67 column 4, line 37 - line 59 column 3, line 73 -column 4, line 15	1-3,6,7, 10,11, 13-15, 17,19,23
Y	---	1,5,9, 21,22
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 04, 30 April 1997 (1997-04-30) -& JP 08 319101 A (TOKYO GAS CO LTD;MITSUBISHI HEAVY IND LTD), 3 December 1996 (1996-12-03) abstract	1,3,6
Y	---	1,5
Y	PATENT ABSTRACTS OF JAPAN vol. 009, no. 087 (M-372), 17 April 1985 (1985-04-17) -& JP 59 213940 A (NISSAN JIDOSHA KK), 3 December 1984 (1984-12-03) abstract	22
Y	US 5 248 566 A (KUMAR ROMESH ET AL) 28 September 1993 (1993-09-28) claims 1,2,12 column 5, line 13 - line 37; figure 3 ---	1,5,9,21
Y	GB 1 447 835 A (NISSAN MOTOR) 2 September 1976 (1976-09-02) claim 1; figure 1 ---	22
	-/-	

INTERNATIONAL SEARCH REPORT

Interr. Appl. No.

PCT/EP 01/03062

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE CA 'Online!' CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; MITSUBISHI HEAVY INDUSTRIES, LTD., JAPAN: "Treatment of fuel for fuel cells" retrieved from STN Database accession no. 102:188069 CA XP002186415 abstract -& JP 59 224074 A (MITSUBISHI HEAVY INDUSTRIES, LTD., JAPAN) 15 December 1984 (1984-12-15) -& DATABASE WPI Section Ch, Week 198505 Derwent Publications Ltd., London, GB; Class E36, AN 1985-028629 XP002186416 & JP 59 224074 A (MITSUBISHI HEAVY IND CO LTD), 15 December 1984 (1984-12-15) abstract -& PATENT ABSTRACTS OF JAPAN vol. 9, no. 99 (E-311), 27 April 1985 (1985-04-27) & JP 59 224074 A (MITSUBISHI HEAVY IND LTD), 15 December 1984 (1984-12-15) abstract ---</p>	1,4
X	<p>DATABASE WPI Section Ch, Week 199504 Derwent Publications Ltd., London, GB; Class L03, AN 1995-025816 XP002186417 -& JP 06 310163 A (SHIKOKU SOGO KENKYUSHO KK), 4 November 1994 (1994-11-04) abstract -& PATENT ABSTRACTS OF JAPAN vol. 1995, no. 02, 31 March 1995 (1995-03-31) & JP 06 310163 A (SHIKOKU SOGO KENKYUSHO KK), 4 November 1994 (1994-11-04) abstract ---</p>	1,10,20
X	<p>PATENT ABSTRACTS OF JAPAN vol. 1999, no. 03, 31 March 1999 (1999-03-31) -& JP 10 334936 A (TOKYO GAS CO LTD;MITSUBISHI HEAVY IND LTD), 18 December 1998 (1998-12-18) abstract ---</p>	1,3,6,9, 10

INTERNATIONAL SEARCH REPORT

Inten	nat Application No
PCT/EP 01/03062	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 02, 28 February 1997 (1997-02-28) -& JP 08 261014 A (MITSUBISHI HEAVY IND LTD; TOKYO GAS CO LTD), 8 October 1996 (1996-10-08) abstract ---	1,3,6
P,A	WO 01 08247 A (IDATECH LLC ; EDLUND DAVID J (US); HERRON THOMAS G (US); HOLMES CRA 1 February 2001 (2001-02-01) page 4, paragraph 2; claims 1,22,23 ---	1,3-5
A	EP 0 957 063 A (TOYOTA MOTOR CO LTD) 17 November 1999 (1999-11-17) column 14, line 32 -column 15, line 3; figure 1 ---	1
A	FR 1 460 767 A (ALLIS CHALMERS MFG CO) 7 January 1966 (1966-01-07) page 1, left-hand column, paragraph 1 ----	8

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interr. 1st Application No

PCT/EP 01/03062

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
EP 0751045	A	02-01-1997	DE	19523109 A1		09-01-1997
			DE	29522067 U1		09-09-1999
			EP	0751045 A2		02-01-1997
			US	6210822 B1		03-04-2001
US 3296449	A	03-01-1967	CH	418062 A		31-07-1966
			BE	643903 A		15-06-1964
			DE	1178512 B		
			FR	1384333 A		04-01-1965
			GB	1003459 A		
			NL	302138 A		
JP 08319101	A	03-12-1996		NONE		
JP 59213940	A	03-12-1984		NONE		
US 5248566	A	28-09-1993		NONE		
GB 1447835	A	02-09-1976	JP	50031516 A		28-03-1975
JP 59224074	A	15-12-1984		NONE		
JP 6310163	A	04-11-1994		NONE		
JP 10334936	A	18-12-1998		NONE		
JP 08261014	A	08-10-1996		NONE		
WO 0108247	A	01-02-2001	AU	6378400 A		13-02-2001
			WO	0108247 A1		01-02-2001
EP 0957063	A	17-11-1999	JP	10139401 A		26-05-1998
			EP	0957063 A1		17-11-1999
			US	6294276 B1		25-09-2001
			WO	9819960 A1		14-05-1998
FR 1460767	A	07-01-1966		NONE		